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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,527	10/24/2003	Vikram R. Jamalabad	010-99X05-D1 (1100.110210)	9837
128 7590 11/02/2006 HONEYWELL INTERNATIONAL INC. 101 COLUMBIA ROAD P O BOX 2245 MORRISTOWN, NJ 07962-2245			EXAMINER WOLLSCHLAGER, JEFFREY MICHAEL	
			ART UNIT 1732	PAPER NUMBER

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/692,527

Applicant(s)

JAMALABAD ET AL.

Examiner

Jeff Wollschlager

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 4-10, 12-17, 22-26, 28-35 and 41-44 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-10, 12-17, 22-26, 28-35 and 41-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
  1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

Applicant's amendment to the drawings, specification, and claims filed August 15, 2006 has been entered. The objection to the drawings, specification and claims has been withdrawn. The 35 U.S.C. 112 second paragraph rejection of claims 34 and 35 is withdrawn. Claims 4, 6, 9, 22, 28-32, 34, and 35 are currently amended. Claims 11 and 27 are cancelled. Claims 41-44 are new. Claims 4-10, 12-17, 22-26, 28-35, and 41-44 are pending and are under examination.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 4-10 and 12-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Andre (U.S. Patent 5,976,339; issued November 2, 1999; priority date October 1, 1993).

Regarding claims 4 and 5, Andre teaches a method for making a three-dimensional object utilizing a layered manufacturing technique (col. 5, lines 35 – col. 6,

line 49). Within this method Andre employs incremental layers of mold materials preferably from a droplet-deposition print head and incremental layers of part material (col. 2, lines 63-67). At the end of the layered manufacturing steps, the mold is removed, leaving the finished product (col. 7, lines 61-67). Andre teaches employing flowable materials for both the part layer/first material and the mold layers/second material (col. 5, line 35-col. 6 line 49).

It is noted that as acknowledged and illustrated in the disclosure of the instant application, layered manufacturing methods employing beads/droplets intrinsically form convex surfaces within the layers (See Figure 3, element (60) and Figure 5, elements (92) and (94) in the instant disclosure, providing illustrative examples for comparison with the teaching of Andre). Therefore, although Andre does not disclose this fact explicitly, and shows substantially flat sidewalls in the Figures, it is an inherent property in Andre's method that the mold material (Figure 3A, element 33), applied in bead/droplet form, would form a convex surface within the mold layer. Since Andre employs the same materials, process steps and conditions as currently claimed, it follows that Andre realizes the same claimed effects and properties absent evidence to support applicant's position.

After forming the first incremental mold layer, Andre forms the first incremental layer of the part material (Figure 3B, element (37); col. 5, lines 56-65). As stated by Andre, this material fills in the space by assuming the dimensions defined by interruption (35) (col. 5, lines 56-65; Figure 3B). Andre further teaches that this layering process is repeated until the product is formed (col. 7, lines 38-40)

Therefore, the layered product, still contained within the mold, as shown in Figures 3A-3C of Andre's patent is the same as the currently claimed layered product, still contained within the mold, shown in Figure 5 of the instant disclosure. Element (33) in Andre forms a convex intralayer region as do elements (92) and (94) in the instant disclosure. Element (37) in Andre fills the space in the same way as elements (97), (98), and (100) do in the instant disclosure. Once the mold (element (33) in Andre) is removed from the product, the product formed by Andre would thus be indistinguishable from the product shown in Figure 6 of the instant disclosure, containing convex inter-layer/between layer regions and concave intra-layer/within layer regions.

Again, it is noted that since Andre employs the same claimed materials, process steps and conditions, it follows that Andre realizes the same claimed effects and properties absent evidence to support applicant's position.

As to claim 6, Andre teaches employing flowable materials for both the part layer/first material and the mold layers/second material (col. 5, line 35-col. 6 line 49). Andre exemplifies electroforming nickel, among other substances as the part material and low melting metals or polymers as the mold material.

As to claim 7, the part layer/first flowable material hardens after being applied to the surface.

As to claim 8, the second material/mold layer is ultimately removed from the product (col. 7, lines 62-65).

Regarding claim 9, Andre teaches a method for making an object of a first material having at least one surface comprising the steps: forming a second material layer formed of a second material up to at least one boundary corresponding to the object surface (Figure 3A) said second material having external convex edges; forming a first material layer formed of the first material adjacent to the boundary and adjacent to the second material layer, wherein the first material is formed in a flowable state such that the first material forms an impression along the boundary of the second material layer (Figure 3B and 3C), said first material having external concave edge impressions adjacent to said second material layer convex edges; repeating the steps a plurality of times (col. 7, lines 38-41), and removing the stack of second material layer from the surface of the object (col. 7, lines 62-65). For a further description comparing Andre and the instant disclosure, see the explanation including element recitations found in the rejection of similar claims 4 and 5 above.

As to claim 10, the first material employed by Andre is different than the second material used by Andre (col. 5, line 35 – col. 6, line 49). For example, Andre exemplifies electroforming nickel, among other substances as the part material and low melting metals or polymers as the mold material.

As to claim 12, Andre teaches the first and second material forming steps form at least one interior surface and at least one exterior surface (Figure 2, element (21)).

As to claim 13, Andre teaches the second material/mold layer is formed using layered manufacturing techniques such as ink-jet droplet deposition (col 2, lines 62-67). Andre further discloses forming the first material product layer through various layered

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manufacturing methods, including electroforming (col. 2, lines 62-67), metal droplet formation/jet solidification techniques, and laser engineering techniques (col. 2, lines 7-40). It is noted that although Andre does not exemplify all these methods, he discloses that they are satisfactory for forming the parts (col. 2, lines 13-15).

As to claim 14, Andre teaches that the first material can be formed as one contiguous bead/droplet stream. Inherently the bead/droplet has a diameter and a length (col. 2, lines 8-18).

As to claim 15, Andre teaches a method wherein the first and second layer forming steps include forming a plurality of substantially circular, overlapping material formations (Figure 2, Figure 3E, Figure 4).

As to claim 16, Andre teaches fusing previously deposited material from the first and second layer forming steps (Figure 3C and col. 4, lines 48-55, col. 6, lines 11-19).

As to claim 17, Andre teaches employing flowable materials for both the part layer/first material and the mold layer/second material (col. 5, line 35-col. 6 line 49). Andre exemplifies electroforming nickel, among other substances as the part material and low melting metals or polymers as the mold material.

### ***Claim Rejections - 35 USC § 103***

Claims 22-26, 28-33 and 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leyden et al. (U.S. Patent 6,660,209; issued December 9, 2003; priority date of at least September 27, 1996).

Regarding claim 22, Leyden et al. teach a method for making a part having a cavity with a first volume and a first structure disposed over the cavity (e.g. cantilevered), the method comprising: supporting the first structure during the building of the first structure by building a second structure/supports/branched supports/hybrid supports of a second material having a second volume within the cavity to support the first structure, building the first structure over the second structure wherein the volume of the second structure is substantially less than the volume of the cavity volume (Figures 28a, 28b, where elements (500) and (502) consist of parts of the first structure, and elements (504), (506), (508) consist of parts of the second structure; col. 41 - col. 52 teach many variations on the second structure) wherein the first structure and the second structure are built by building layers of beads from deposited inks, plastics and other means (Abstract; col. 10, lines 10 – col. 12, line 11; col. 42, line 41- col. 42, line 20; Figures 28a, 28b).

Leyden et al. also provide teaching that the drop location of the material (e.g. pixels) is controlled as desired to accurately build an object (col. 12, line 65 – col. 13, line 8) and that the objects may be built in a staggered or offset pattern (col. 14, lines 20-40). Leyden et al. further disclose drop locations may be offset by a fractional amount of the spacing between pixels and that the spacing may be  $\frac{1}{2}$ ,  $\frac{1}{3}$ , or  $\frac{1}{4}$  or some other amount, with the pixels of the pixel boundaries of adjacent rows or layers such that it takes more two or more layers before pixel patterns realign on subsequent layers (col. 19, lines 29-67). As such, creating a sloping side face of at least a portion of the second structure having a plurality of indented layers indented less than or equal to



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about one-half a bead width would have been *prima facie* obvious to one having ordinary skill in the art for the purpose of accurately building a desired object as suggested by Leyden et al.

As to claims 23-25, Leyden teaches that the support structure must be easily removable, that they should be formed using a minimal number of passes and that the building speed should be optimized to increase efficiency (col. 42, line 49 – col. 43 lines 20). As such, the configuration, size, and volume of the second structure is a result effective variable that would have been readily optimized as is routinely practiced in the art.

As to claim 26, Leyden teaches the second material is different from the first material (col. 51, lines 10-12).

As to claims 28-32, Leyden teaches that the support structure must be easily removable, that they should be formed using a minimal number of passes and that the building speed should be optimized to increase efficiency (col. 42, line 49 – col. 43 lines 20; col. 44, lines 8-35; col. 45, line 67 – col. 46, line 10; col. 47, lines 34-57). Leyden also exemplifies sloped support structures (Figure 28b). Leyden et al. also provide teaching that the drop location of the material (e.g. pixels) is controlled as desired to accurately build an object (col. 12, line 65 – col. 13, line 8) and that the objects may be built in a staggered or offset pattern (col. 14, lines 20-40). Leyden et al. further disclose drop locations may be offset by a fractional amount of the spacing between pixels and that the spacing may be  $\frac{1}{2}$ ,  $\frac{1}{3}$ , or  $\frac{1}{4}$  or some other amount, with the pixels of the pixel

boundaries of adjacent rows or layers such that it takes more two or more layers before pixel patterns realign on subsequent layers (col. 19, lines 29-67).

As to claim 33, Leyden teaches that the cavity has a floor (Figure 28b, element (500)) and the second structure/supports/branched supports/hybrid supports include building a column having a top and middle portion where the top portion is wider than the middle portion (Figure 28b showing the top of the support structure is wider than the middle which is wider than the bottom).

Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leyden et al. (U.S. Patent 6,660,209; issued December 9, 2003; priority date of at least September 27, 1996), as applied to claims 22-26, 28-33 above, and further in view of Masters (U.S. Patent 5,216,616; issued June 1, 1993).

As to claims 34 and 35, Leyden et al. teach the method of claim 22 as discussed in the 103(a) rejection above, but do not expressly meet the limitations of the claims. However, Masters provides teaching in an analogous method where the second structure/web has a corner support piece to support the ceiling from the sidewall and the corner piece is bonded to the ceiling near the corner and to the sidewall. (Figure 8; elements (80-web), (72-ceiling), and (70-sidewall)).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to employ the explicit technique exemplified by Masters in the method of Leyland et al. for the purpose of providing the required support for the production of a desired object having a desired shape.

Claims 41-44 are rejected under 35 U.S.C. 102(b) as being anticipated by or in the alternative under 35 U.S.C. 103(a) as being obvious over Masters (U.S. Patent 5,216,616; issued June 1, 1993).

Regarding claim 41, Masters teaches a method for making a part of a first material, the part having a cavity with a bottom, a first volume and a first structure disposed over the cavity comprising the steps: building at least a portion of the first structure; building a second structure of a second material have a second volume within the cavity to support the first structure during the building of the first structure wherein the second structure building steps forms said second structure abutting the first structure along an interior wall of the cavity and wherein the second structure does not extend to the bottom of the cavity (Figure 8, elements 80, 72, 70). It is noted that the exemplified "7" is employed to demonstrate the principle of the system disclosed by Masters and is not limiting (col. 6, lines 36-46). Alternatively, other shapes employing a web to support an overhang/cantilevered structure with a more completely defined bottom would have been *prima facie* obvious to the ordinarily skilled artisan at the time of the claimed invention (col. 6, lines 36 – col. 7, line 9; col. 7, lines 20-24).

As to claim 42, the second volume is substantially less than the cavity volume.

Regarding claim 43, Masters teaches a method comprising the steps: supporting the first structure during the building of the first structure by building a second structure of a second material having a second volume within the cavity to support the first structure. The second structure building step forms the second structure attached to

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the first structure along at least one interior wall of the cavity (col. 6, lines 36 – col. 7, line 9; col. 7, lines 20-24; Figure 8, elements 80, 72, 70). It is noted that the exemplified “7” is employed to demonstrate the principle of the system disclosed by Masters and is not limiting (col. 6, lines 36-46). Alternatively, other shapes employing a web or column to support an overhang/cantilevered structure with a more completely defined interior wall would have been *prima facie* obvious to the ordinarily skilled artisan at the time of the claimed invention

As to claim 44, the second volume is substantially less than the cavity volume.

### ***Response to Arguments***

Applicant's arguments filed August 15, 2006 regarding Andre and Leyden et al. have been fully considered but they are not persuasive. Applicant's arguments regarding Masters et al. and Li are moot in view of the new grounds of rejection.

Applicant's arguments appear to be on the following grounds:

1. Andre does not teach the mold material 33 and the object material 37 are applied such that convex inter-layer regions are formed or that external convex edges are formed of a second material and that concave edge impressions of a first material are formed. Evidence for this argument is provided by pointing to the Figures in Andre. These limitations could be present but are not necessarily present.

2. There is no motivation for one of ordinary skill to make the specific modification to the method of Leyden et al. that a sloping side face/indented layer of the

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second/support structure is formed of beads indented between  $\frac{1}{2}$  a bead width and  $\frac{1}{10}$  a bead width.

Applicant's arguments are not persuasive for the following reasons:

1. As discussed in the rejection of claim 4 above, Andre employs the same materials, process steps and conditions as currently claimed. It follows therefore that Andre realizes the same claimed effects and properties absent evidence to support applicant's position. The examiner acknowledges that Andre does not illustrate convex or concave regions in the Figures. However, these limitations are necessarily present, to some degree, for the reasons provided above. There is no evidence on this record suggesting otherwise.

2. As discussed in the rejection of claim 22 above, Leyden et al. provides motivation for controlling the drop location of the material and further exemplifies sloped supports (Figures 28a, 28b; col. 12, line 65- col. 13, line 8; col. 14, line 20-40; col. 19, lines 29-67).

### ***Conclusion***

All claims are rejected.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JW

Jeff Wollschlager  
Examiner  
Art Unit 1732

October 25, 2006

  
CHRISTINA JOHNSON  
SUPERVISORY PATENT EXAMINER  
10/30/06